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NPIC/R-1665/64
December 1964

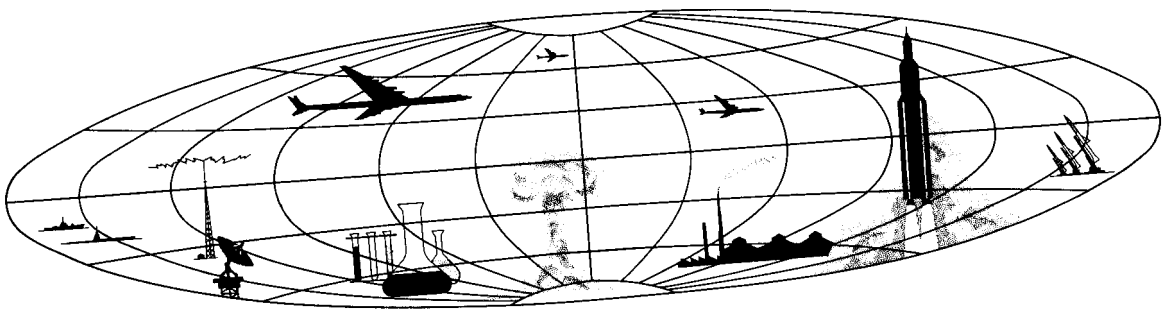
PHOTOGRAPHIC INTERPRETATION REPORT

COMMUNICATIONS FACILITIES SHUANG-CHENG-TZU MISSILE TEST CENTER CHINA

CIA

DIA

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER



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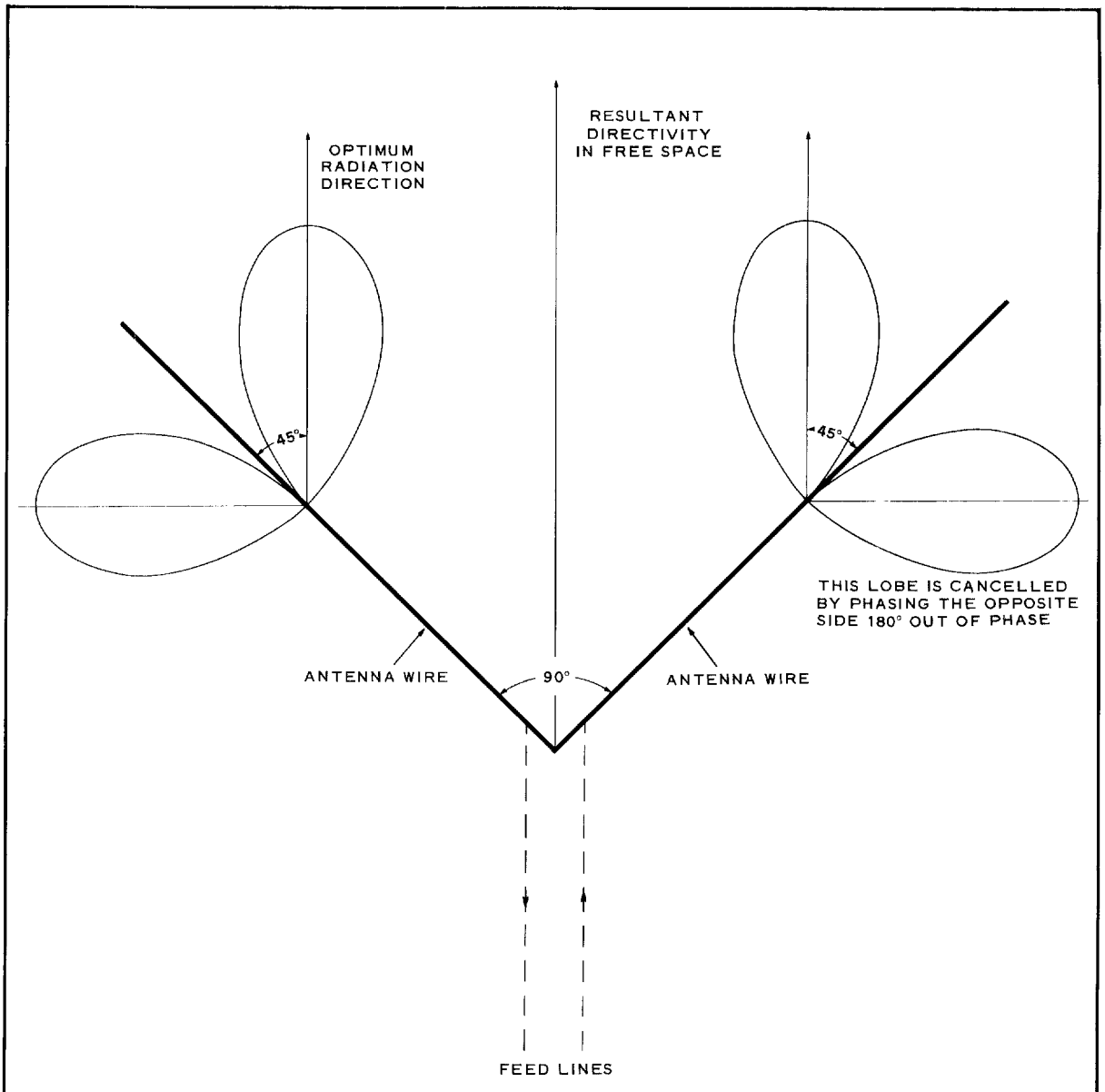

In the typical radiation pattern of a terminated vee antenna of one wavelength with a 90 degree apex angle, the angle of maximum radiation with respect to the antenna wires is 45 degrees, the resultant lobes combining in space to form a slightly more directive pattern which bisects the antenna legs. Propagation would be bi-directional if the antenna were not terminated.

NPIC J-6446 (12/64)

FIGURE 1. RADIATION PATTERN OF A TYPICAL SCTMTC VEE ANTENNA.

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INTRODUCTION

Detailed photo analysis of the antennas at four communications facilities at the Shuang-cheng-tzu Missile Test Center (SCTMTC) has established mensural parameters which permit the determination of theoretical design frequencies, effective signal areas, and probable correspondents. The details of this information are presented in parallel format for each facility: a brief commentary, a graphical layout, an extensive tabulation of critical dimensions, and a map showing great-circle projections and probable correspondents.

In brief summary, however, it can be pointed out that although the frequencies have quite an overall spread, they tend to be grouped from 3.5 to 5.5 megacycles (mc) for the night antennas and from 6.0 to 9.4 mc for the day antennas. Also, the probable correspondents of the rangehead facilities are located principally in the Peiping and Lop Nor areas, while those of the airfield facilities show a rather equal distribution between the Peiping-Lop Nor axis and a fan-shaped spread of airfields through the southeast, south-central, and southwest portions of China.

The four facilities, consisting of separate transmitting and receiving installations at both the rangehead and airfield, were first identified in [redacted], indicating that as of that date the SCTMTC was communications-related not only with the [redacted] area but with many of the principal airfields of China as well. A previous report 1/ has described the SCTMTC facilities and, inasmuch as this information remains substantially correct, it has not been repeated; however, facility names and antenna numbers are retained to facilitate comparison.

25X1D

25X2

Range, Coverage, and Skip Distance

All rhombic antennas at the SCTMTC facilities have the same 65-degree tilt angle, so that the assumption of an average altitude of 200 statute miles (sm) for the ionized layer results in a skip distance (first hop) of 800 sm. Although this assumed altitude may fluctuate considerably because of both seasonal and time-of-day factors and thus alter somewhat the exact skip distance, it is interesting to note that the maximum signal for all westward-oriented rhombics still occurs in an area some 300 sm to the west of Lop Nor.

Inspection of the vee antennas (Figure 1), found primarily at the airfield facilities, shows them to be short in both physical length and wavelength. This condition, together with their high wave angle of approximately 30 degrees, suggests that they offer broad and perhaps complete coverage of aircraft operating in the airspace of central China. All of the vee antennas have the same included, or apex, angle of 90 degrees, which indicates--assuming the same 200-sm average height for the ionized layer--a maximum effective range of around 600 sm.

The half-wave antennas probably do not have a reliable range in excess of 600 sm, either. Although this range extends far enough westward to include the Lop Nor area, it makes it extremely doubtful if the eastward-oriented antennas correspond with Peiping and suggests instead some closer location such as Pao-tou or Ta-tung.

It was not considered necessary to extend the great-circle projections as far as Europe or the Pacific area since there is no indication that the antennas are designed to correspond beyond the limits suggested above.

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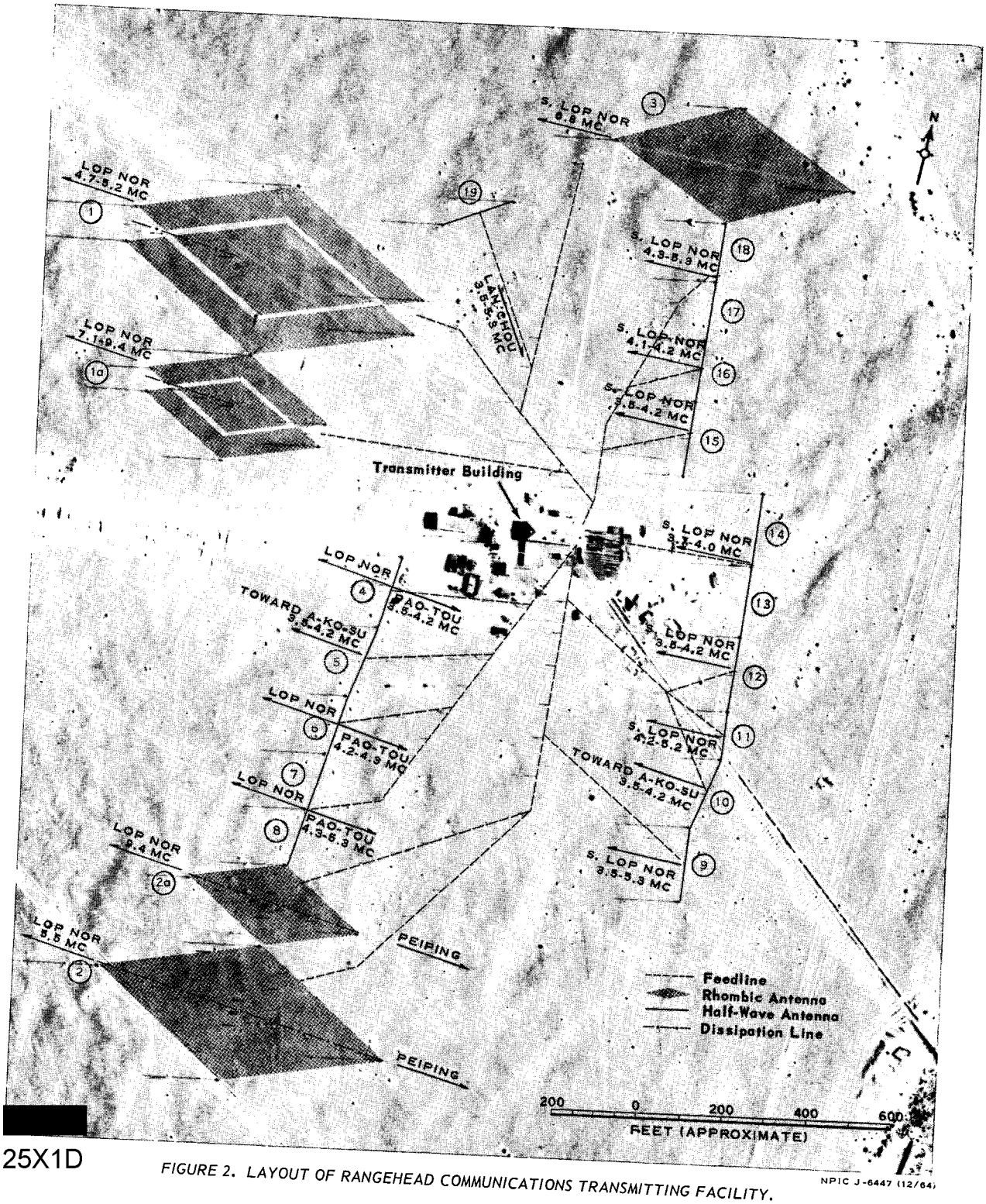


25X1D

FIGURE 2. LAYOUT OF RANGEHEAD COMMUNICATIONS TRANSMITTING FACILITY.

Methodology

Although the frequencies and correspondents furnished in this study are believed to convey the communications situation with relative accuracy, they are not represented as absolutes. They were derived by utilizing standard engineering design charts, but such charts are compiled from statistical averages and therefore yield average answers. For this reason, and because of other limitations peculiar to photographic analysis, numerous cross-checks have been applied, utilizing procedures set forth in both Russian and American texts, in order to make the final results compatible with both observed measurements and expected design factors.

RANGEHEAD COMMUNICATIONS TRANSMITTING FACILITY

25X1D
25X1D

This facility (Figure 2) is situated at 41-06-[redacted] 100-17-[redacted] 3 nautical miles (nm) north-northeast of the Housing and Support Area of the SSM-SAM Assembly and Checkout Complex. It contains 5 rhombic and 13 half-wave antennas, the technical data for which are presented in Tables 1 and 2.

25X1D

[redacted]

Antennas 1 and 1a (Table 1) are double-end-pole rhombics with the side poles higher than the end poles and with one end pole higher than the other, indicating one antenna is positioned under the other. These two antennas propagate in a westward direction only. Antennas 2, 2a, and 3 have side poles of the same height as the end poles and are not over-and-under arrangements. Antennas 2 and 2a have been constructed to propagate to both east and west. It is not apparent in which direction antenna 3 propagates, but its feed point is at the western end, indicating it may propagate only eastward.

Antennas 7 and 8, 13 and 14, and 17 and 18 (Table 2) were previously carried as separate antennas, 1/ but further inspection shows each pair to have a common feed so that they combine into a single full-wave antenna with each side being one-half wavelength.

The great-circle projections of the antenna propagation azimuths and the probable correspondents of this facility are shown in Figure 6.

RANGEHEAD COMMUNICATIONS RECEIVING FACILITY

25X1D
25X1D

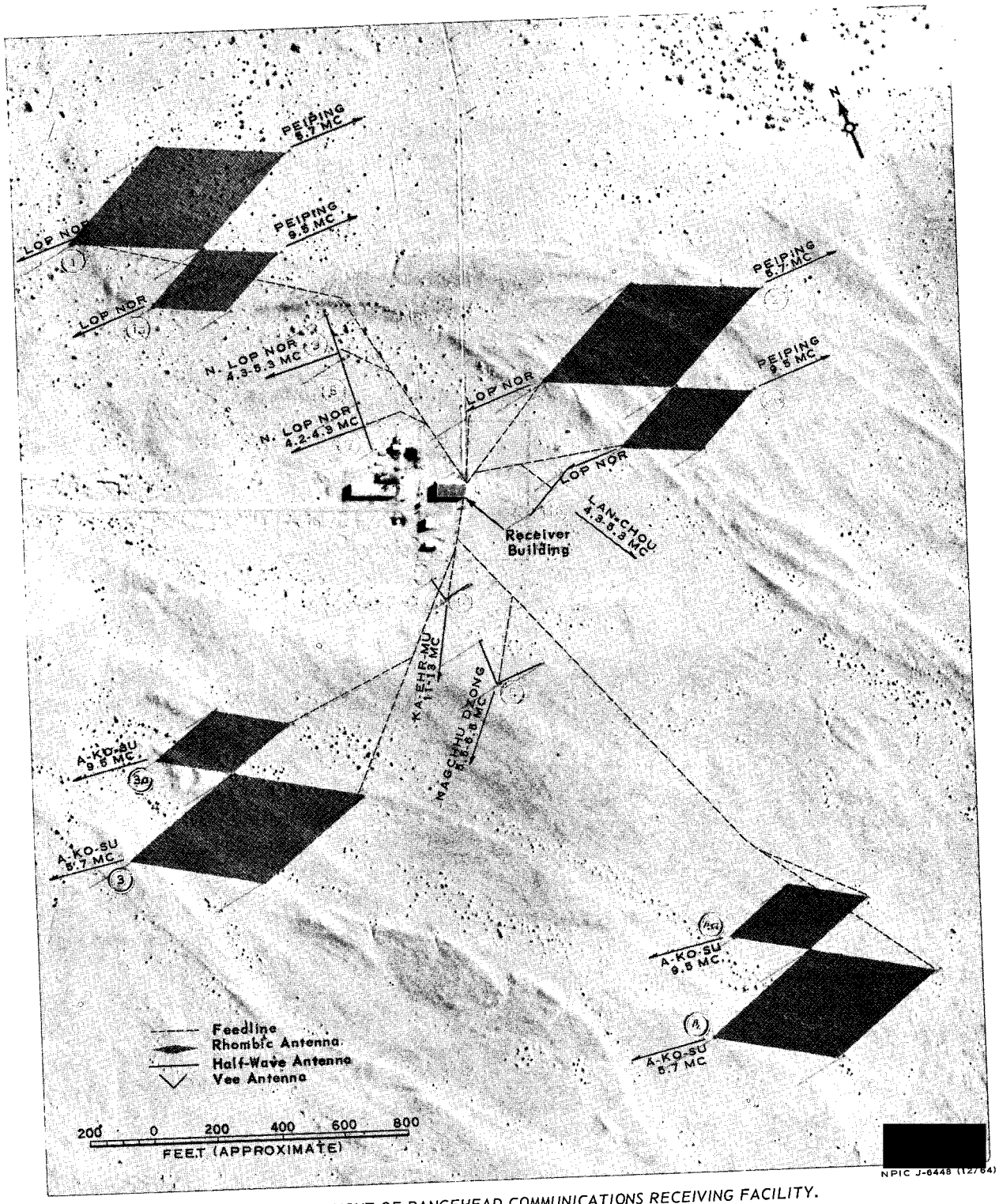
This facility (Figure 3) is situated at 40-52-[redacted] 100-07-4[redacted], 4.5 nm southwest of the Main Support Base. It contains 8 rhombic antennas arranged as 4 day-night pairs, 2 vee antennas, and 3 half-wave horizontal dipole antennas, the technical data for which are given in Tables 3, 4, and 5.

Antennas 8 and 9 (Table 5) were previously carried as separate antennas, 1/ but further inspection has shown them to be actually one full-wave antenna center-fed at the common center pole with each side being one-half wavelength. The same numbering is retained, however.

The great-circle projections of the antenna propagation azimuths and the probable correspondents of this facility are shown in Figure 7.

25X1D

[redacted]



25X1D

FIGURE 3. LAYOUT OF RANGEHEAD COMMUNICATIONS RECEIVING FACILITY.

25X1D

[redacted]

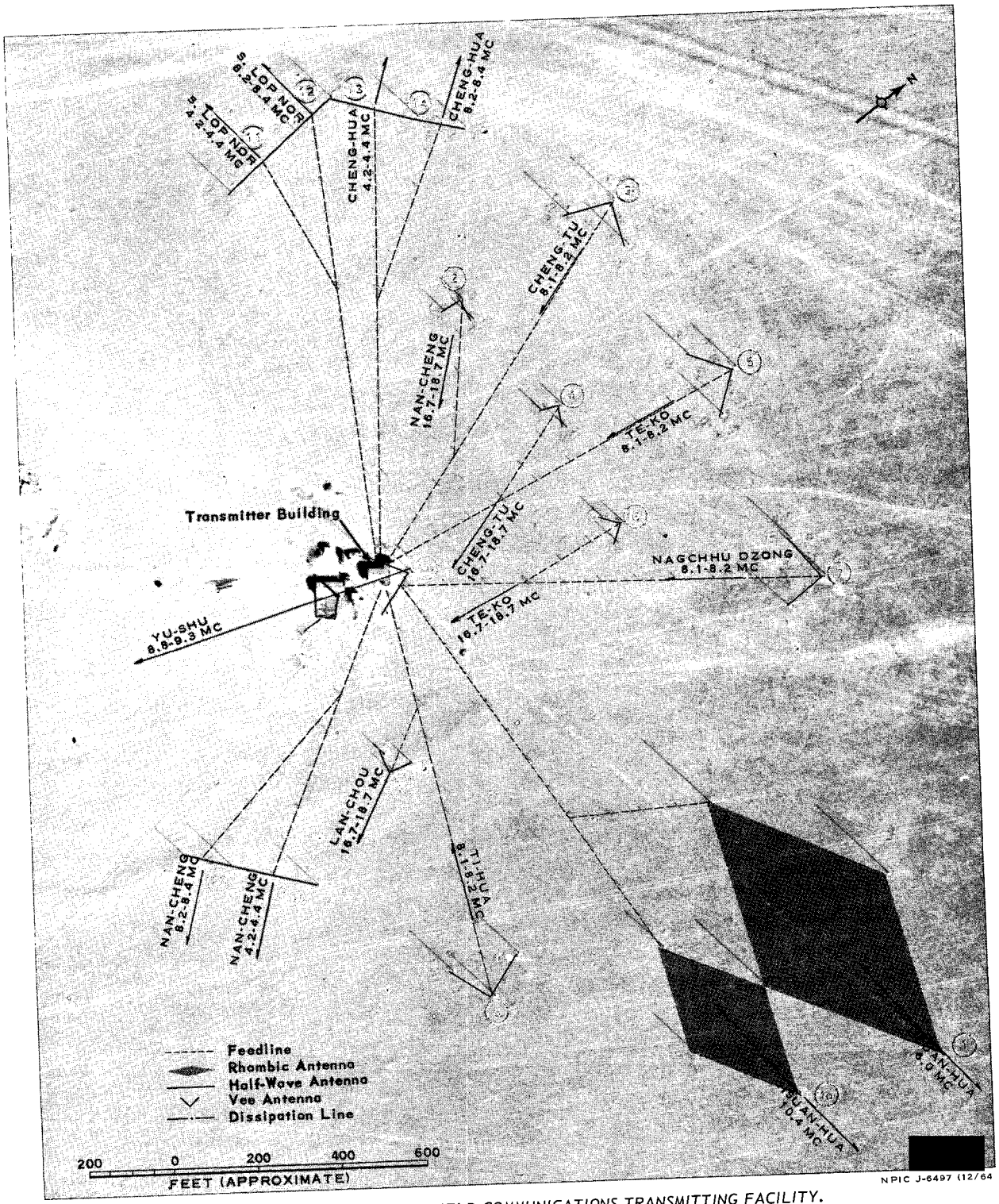
AIRFIELD COMMUNICATIONS TRANSMITTING FACILITY

25X1D
25X1D This facility (Figure 4) is situated at 40-23-[redacted] 99-46-[redacted] 1.8 nm northwest of the center of the airfield runway. It contains 2 rhombic antennas arranged as a day-night pair, 9 vee antennas, and 6 half-wave horizontal dipole antennas, the technical data for which are given in Tables 6, 7, and 8.

In the process of calculating frequencies for the half-wave antennas, it was found necessary to allow one-quarter of a wavelength off each end (a total of 50 per cent for each antenna) in order to avoid inconsistencies with the measured pole heights and spacings.

25X1D

[redacted]



25X1D

FIGURE 4. LAYOUT OF AIRFIELD COMMUNICATIONS TRANSMITTING FACILITY.

25X1D

[redacted]

The great-circle projections of the antenna propagation azimuths and the probable correspondents of this facility are shown in Figure 8.

AIRFIELD COMMUNICATIONS RECEIVING FACILITY

25X1D
25X1D

This facility (Figure 5) is situated at 40-24-[redacted] 99-45-[redacted] 3 nm northwest of the center of the airfield runway. It contains 4 vee and 4 half-wave antennas, the technical data for which are given in Tables 9 and 10.

The great-circle projections of the antenna propagation azimuths and the probable correspondents of this facility are shown in Figure 9.

[redacted]

25X1D

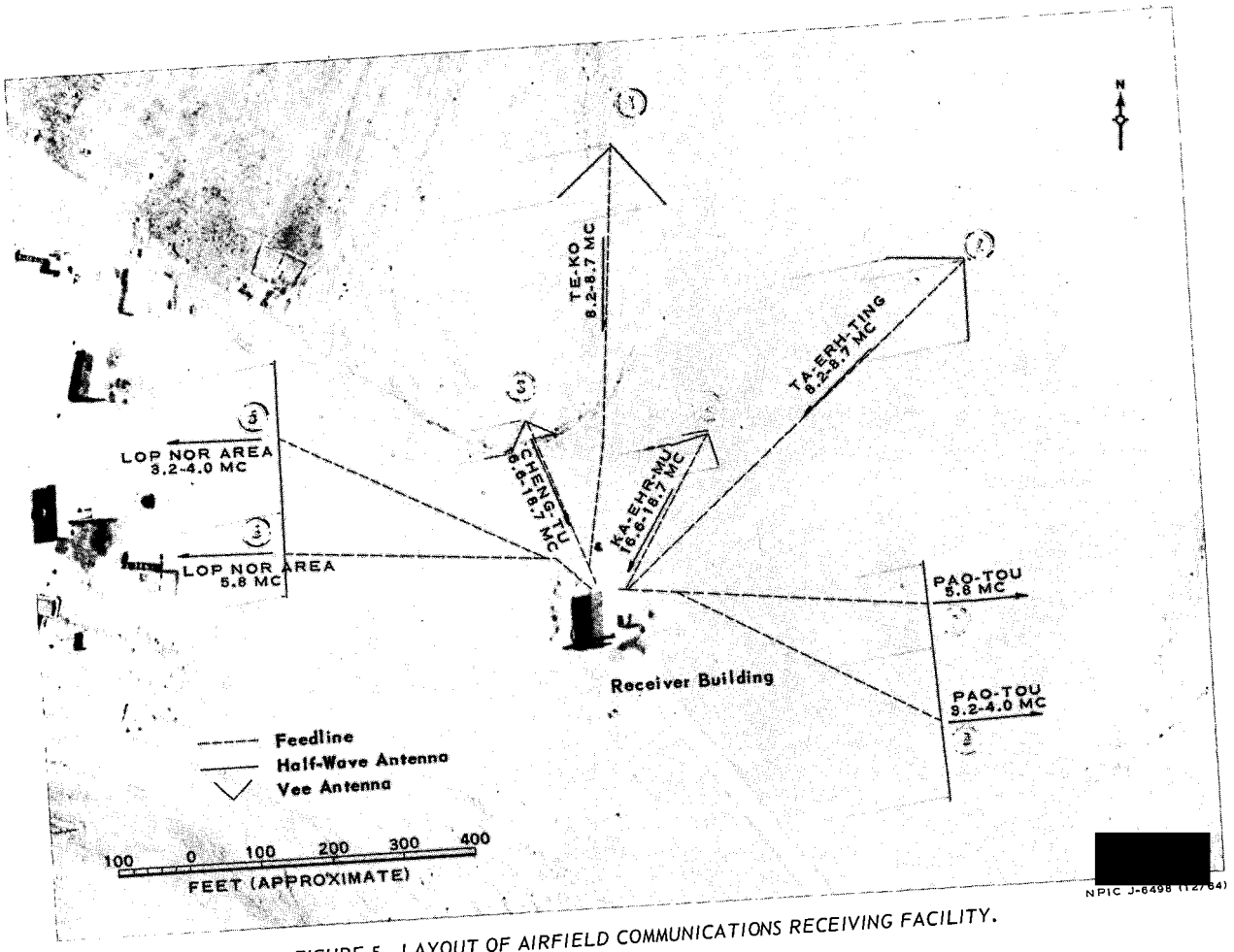


FIGURE 5. LAYOUT OF AIRFIELD COMMUNICATIONS RECEIVING FACILITY.

25X1D

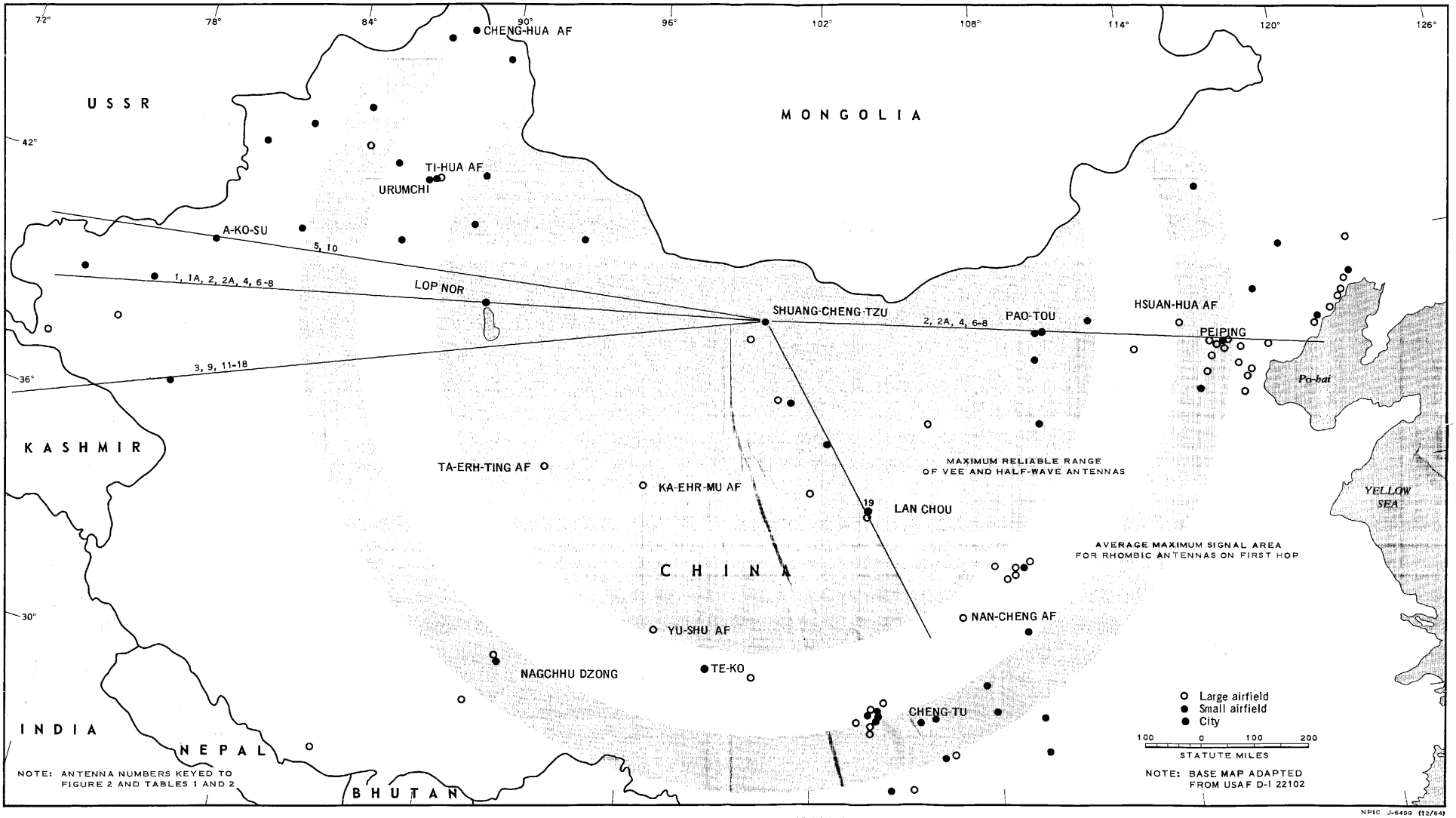


FIGURE 6. PROBABLE CORRESPONDENTS OF RANGEHEAD TRANSMITTING FACILITY.

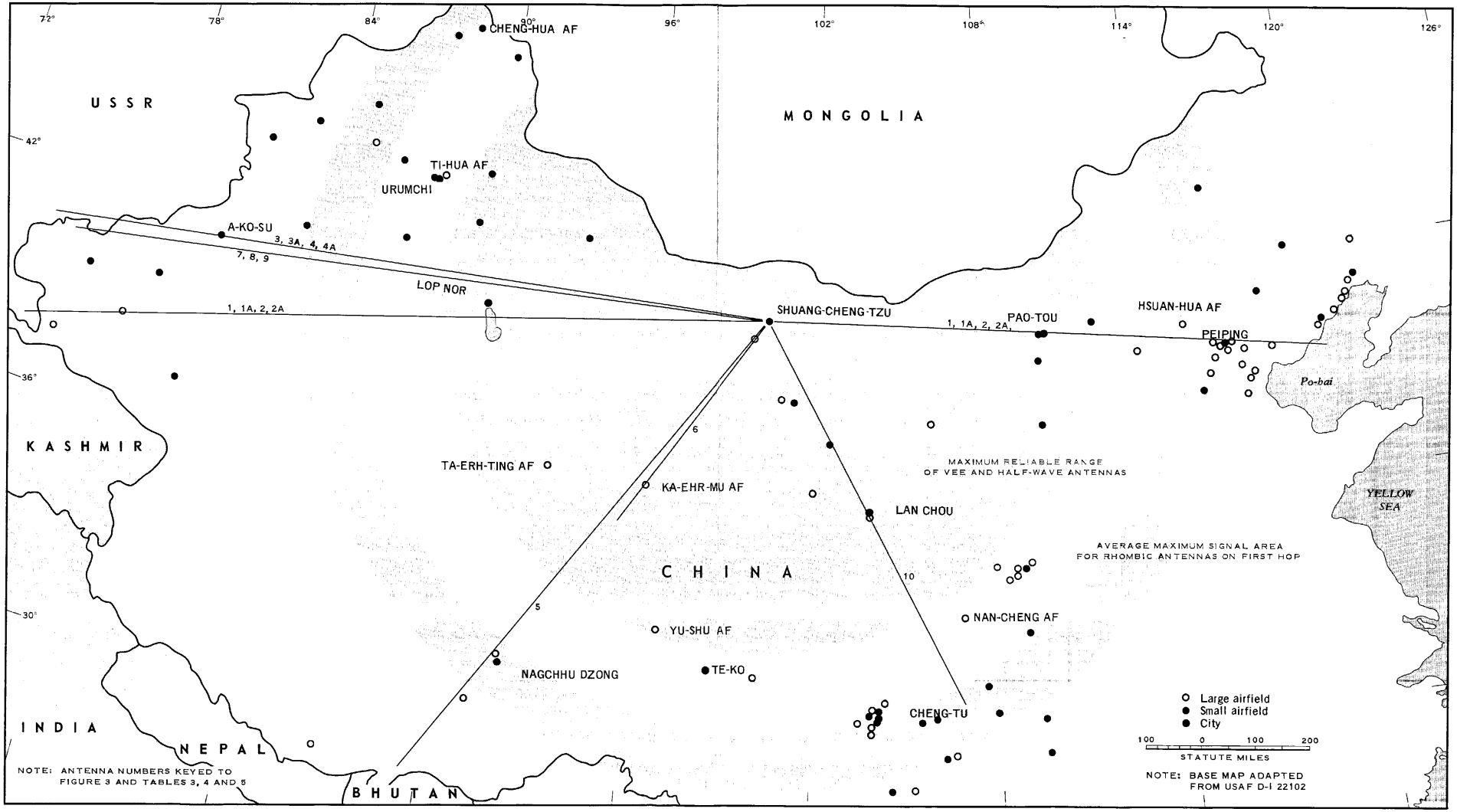


FIGURE 7. PROBABLE CORRESPONDENTS OF RANGEHEAD RECEIVING FACILITY.

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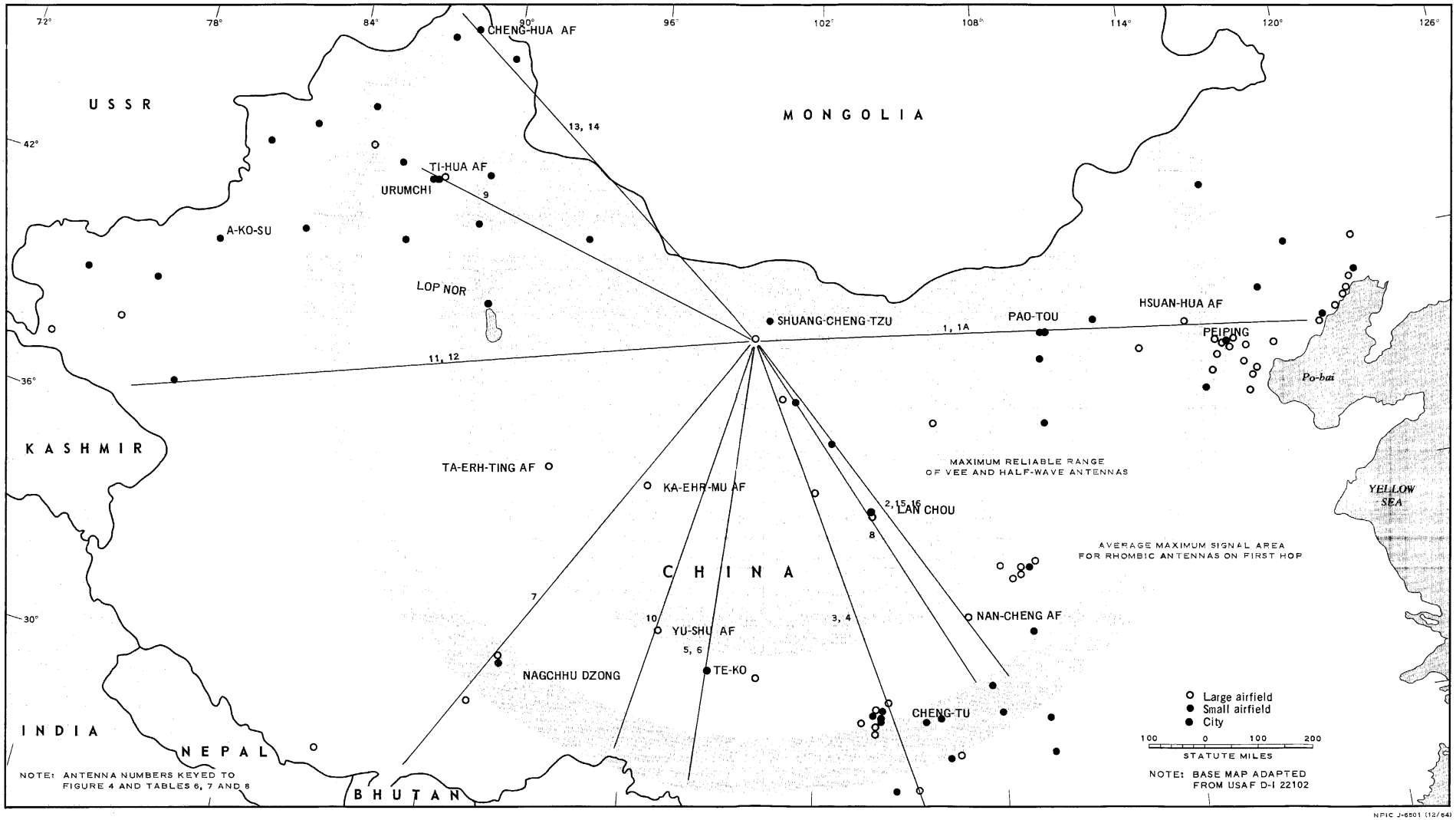

FIGURE 8. PROBABLE CORRESPONDENTS OF AIRFIELD TRANSMITTING FACILITY.

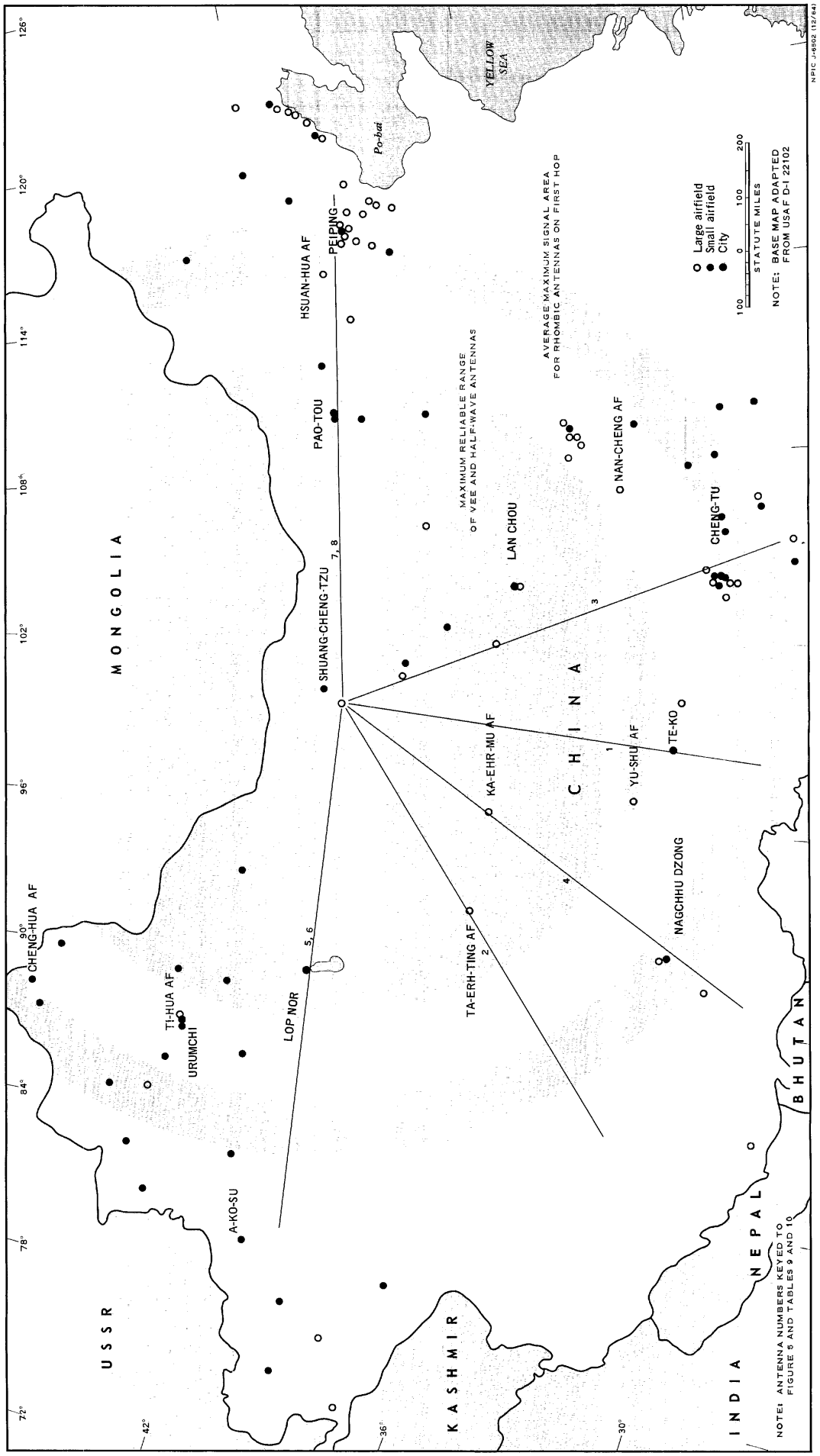

FIGURE 9. PROBABLE CORRESPONDENTS OF AIRFIELD RECEIVING FACILITY.

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REFERENCES

PHOTOGRAPHY

25X1D [redacted]

Classification

SECRET/No Foreign Dissem

MAPS OR CHARTS

USAF. D-I 22102, *Communist China Airfield and Seaplane Station Locations*, Jan 64, scale 1:7,600,000 (approx) (SECRET)

DOCUMENT

1. NPIC. R-1065/64, *Shuang-cheng-tzu Missile Test Center, China*, Jan 64 (SECRET/No Foreign Dissem)

REQUIREMENT

CIA. C-RR4-81,827

NPIC PROJECT

11771/64

[redacted]

25X1C

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